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Continuous Deflection Separation, Fuzzy Filter and UV Treatment of SSO-Type Wastewaters: Pilot Study Results

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Notice

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Foreword

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The National Risk Management Research Laboratory is the Agency's center for investigation of technological and management approaches for preventing and reducing risks from pollution that threatens human health and the environment. The focus of the Laboratory's research program is on methods and their cost-effectiveness for prevention and control of pollution to air, land, water, and subsurface resources; protection of water quality in public water systems; remediation of contaminated sites, sediments and ground water; prevention and control of indoor air pollution; and restoration of ecosystems. NRMRL collaborates with both public and private sector partners to foster technologies that reduce the cost of compliance and to anticipate emerging problems. NRMRL's research provides solutions to environmental problems by: developing and promoting technologies that protect and improve the environment; advancing scientific and engineering information to support regulatory and policy decisions; and providing the technical support and information transfer to ensure implementation of environmental regulations and strategies at the national, state, and community levels.

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E. Timothy Oppelt, Director
National Risk Management Research Laboratory

Abstract

This report was submitted in fulfillment of Cooperative Agreement Number X-82435210 by HydroQual, Inc. under the partial sponsorship of the United States Environmental Protection Agency. Partial sponsorship was also provided by the New York State Energy Research and Development Authority, Albany, New York, and Rockland County Sewer District No. 1, Orangeburg, New York. This report covers a period from August 1998 to January 2001, and work was completed as of November 1999.

The demonstration project first entailed operation of a continuous deflection separation (CDS) unit to treat raw wastewaters, similar to sanitary sewer overflow (SSO) and combined sewer overflow (CSO) in solids characteristics. Two screens were evaluated, with 1200-micron and 600-micron apertures, substantially smaller than the CDS technology typically used (2400-micron) for floatables removal. Total suspended solids (TSS) removals averaged 10 and 30 percent for the two screen sizes, respectively. The smaller screen was observed to blind at its surfaces, while the 1200-micron retained the desired self-cleaning capability characteristic of this technology.

Other technologies were also tested at the same time with the CDS units. A fiber-based media, high-rate filter, the Fuzzy Filter, was operated downstream of the CDS unit. At loadings between 400 and 600 Lpm/m^2 (10 and 15 gpm/ft^2), it was capable of achieving approximately 40 percent TSS removals. The process was found to effectively remove particles greater than 50-micron, which benefitted the performance of downstream UV disinfection processes.

Three different UV configurations were operated downstream of the CDS and Fuzzy Filter processes. One used low-pressure, high output lamps while the other two used medium pressure lamps. The medium pressure units comprised a closed-chamber and an open-channel unit. In addition to operating the pilot units, collimated-beam, dose-response testing was conducted on the primary-type wastewaters. The results of the study suggest that 2-log reductions can be consistently accomplished at doses on the order of 30 mJ/cm^2, with minimal removal of particulates. These reductions can be increased to between 2.3 and 2.8 with removal of larger particles, greater than approximately 50-micron. These results are based on enumeration of blended samples. If the exposed samples are not blended, the apparent reductions will be between 2.5 and 3.5 logs.

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Acknowledgment

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